



# **SAMPLING STONE, SLAG, GRAVEL, SAND, AND STONE BLOCK FOR USE AS HIGHWAY MATERIALS**

## **1. SCOPE**

1.1 These methods are intended to apply to the sampling of stone, slag, gravel, sand, and stone block for a variety of purposes.

1.1.1 Preliminary investigation of sources of supply

1.1.2 Acceptance or rejection of source of supply

1.1.3 Inspection of shipments of materials

1.1.4 Inspection of materials at Bituminous and Portland Cement Concrete plants

1.1.5 Inspection of materials on the site of the work.

1.2 Acceptance and control tests vary with the type of construction in which the material is used.

1.3 Samples of slag sand, stone sand, screenings, mine tailings, and all other similar materials shall be sampled in the same manner as prescribed for materials of similar size and classification.

## **2. DEFINITIONS**

2.1 *Roadside Production* – the production of materials with portable or semi-portable crushing, screening, or washing plants established or reopened in the vicinity of the work on a designated project, for the purpose of supplying materials for that project.

## **3. SAMPLING**

3.1 Responsibility of sampling.

3.1.1 The purchaser, or his authorized representative, shall take samples of all materials for testing that are to be the basis of acceptance or rejection of a supply.

3.1.2 The seller or owner of the supply may submit samples used for inspection or preliminary testing.

3.2 The number of samples required depends on the intended use of the material, the quantity of material, and the variations both in quality and size of the aggregate. A sufficient number of samples shall be obtained to cover all variations in the material.

- 3.3 Sample size is dependent on the type and number of tests the material is subject to. The table below shows approximate sample sizes that shall be taken, based on the Nominal Maximum size of the aggregate for gradation analysis.

**Table 1 – Sample Sizes**

<b>Nominal Maximum Size of Particles, Passing Sieve</b>	<b>Minimum Weight of Field Samples, lb (kg).</b>
<i>Fine Aggregate</i>	
No. 10 (2.0 mm)	10 (4.5)
No. 4 (4.75 mm)	10 (4.5)
<i>Coarse Aggregate</i>	
<sup>3</sup> / <sub>8</sub> in. (9.5 mm)	25 (11.5)
<sup>1</sup> / <sub>2</sub> in. (12.7 mm)	25 (11.5)
<sup>3</sup> / <sub>4</sub> in. (19 mm)	25 (11.5)
1 in. (25.4 mm)	25 (11.5)
1 <sup>1</sup> / <sub>2</sub> in (38 mm)	25 (11.5)
2 in. (51 mm)	40 (18)
2 <sup>1</sup> / <sub>2</sub> in. (63.5 mm)	40 (18)
3 in. (76.2 mm)	40 (18)
3 <sup>1</sup> / <sub>2</sub> in. (89 mm)	40 (18)

- 3.4 Samples obtained in the field should be prepared for testing by quartering or other suitable means to ensure a representative sample.

#### **4. PROCEDURE FOR SAMPLING STONE FROM LEDGES OR QUARRIES**

- 4.1 The ledge or quarry face of the stone shall be inspected to determine any variation in different strata. Differences in color and structure shall be observed.
- 4.2 Separate samples of stone weighing at least 25 lb. (11 kg) each and consisting of specimens that are obviously not weathered beyond a degree of usefulness for the purpose intended, shall be obtained from all strata that appear to vary in color and structure.
- 4.3 In addition to the general information accompanying all samples, the following information shall accompany samples from local ledges that are not commercial sources:
- 4.3.1 Name of owner or seller
  - 4.3.2 Approximate quantity available (if quantity is very large this can be recorded as practically unlimited)
  - 4.3.3 Quantity and character of overburden or stripping
  - 4.3.4 Length of haul to nearest point on road where the materials is to be used
  - 4.3.5 Character of haul (kind of road and grade)

- 4.3.6 Some detailed record of the extent and location of the material represented by each sample. A sketch, plan and elevation, showing the thickness and location of the different layers is recommended for this purpose.

## **5. PROCEDURE FOR SAMPLING SAND AND GRAVEL ROADSIDE PRODUCTIONS AND BANK RUN**

- 5.1 Samples shall be chosen as to represent the different materials, discernible to the sampler, that are available in the deposit. An estimate of the quantity of the different materials shall be made.

### 5.2 Open-face bank or pit samples

- 5.2.1 The sample should be obtained by channeling the face vertically, bottom to top, *so that it will be representative of the material proposed to be used.*
- 5.2.2 Do not include overburden and disturbed material in the sample
- 5.2.3 Test holes shall be excavated or drilled at numerous locations in the deposit to determine the quality of the material and the extent of the deposit. The number and depth of these test holes will depend on the quantity of the material to be used, topography of the area, nature of the deposit, character of the material, and value of the resultant product.
- 5.2.4 Separate samples shall be obtained from the face of the bank and from test holes in the manner described in 5.2.3.
- 5.2.5 If visual inspection indicates that there is considerable variation in the material, individual samples shall be selected to represent the material in each well-defined stratum. Otherwise, large samples from each test location shall be obtained and reduced to the proper size by thoroughly mixing and quartering.
- 5.2.6 The size of the samples shall be such that at least 25 lb. (11 kg) of sand and 75 lb. (34 kg) of gravel are available for tests (if both are present).
- 5.2.7 If the deposit being investigated does not have an open face, samples shall be obtained entirely from test holes.

### 5.3 Stockpile Samples

- 5.3.1 In sampling material from stockpiles it is very difficult to ensure representative samples due to the segregation which usually occurs when material is stockpiled.

- 5.3.2 When it is necessary to sample stockpiles, every effort should be made to enlist the services of power equipment that is capable of exposing the material at various levels and locations.
  - 5.3.3 Separate samples shall be taken from different areas of the stockpile to represent the material in that portion. Test results of the individual samples will indicate the extent of segregation existing in the stockpiles.
  - 5.3.4 In sampling sand from stockpiles, the outer layer, which may have become dry and caused segregation, shall be removed and a representative sample of the damp sand selected.
- 5.4 In addition to the general information accompanying all samples, additional information must accompany all samples from roadside productions that are not commercial operations.
- 5.4.1 Name of owner or seller
  - 5.4.2 Location of supply
  - 5.4.3 Approximate quantity available
  - 5.4.4 Quantity and character of overburden
  - 5.4.5 Length of haul to proposed site of work
  - 5.4.6 Character of haul (kind of road, maximum grades, etc.)
  - 5.4.7 Some detailed record of the extent and location of the material represented by each sample. A sketch of plan and elevation, showing the thickness and location of the different layers, is recommended for this purpose.

**6. PROCEDURES FOR SAMPLING SAND, GRAVEL, STONE, AND SLAG:  
COMMERCIAL SOURCES**

- 6.1 Where practical, samples from commercial sources to be tested for quality shall be obtained from the finished product.
- 6.2 Samples to be tested for abrasion loss shall be obtained from commercially prepared material without subsequent crushing or manual reduction in particle size for preparation of the abrasion test sample.
- 6.3 Specific guidelines should be followed when sampling sand, gravel, stone and slag commercial sources at the plant.
  - 6.3.1 A general inspection of the plant and record of the screening facilities shall be made.

- 6.3.2 Samples shall be taken at some suitable location that will ensure positive representative sampling of the railroad cars, barges, stockpiles, or bins.
  - 6.3.3 To determine variations in the grading of the material, separate samples shall be obtained at different times while the material is being loaded.
  - 6.3.4 If the samples are taken from a bin, they shall be taken from the entire cross-section of the flow of material as it is being discharged. At the beginning of the discharge from the bins, sufficient material should be permitted to flow to ensure normal uniformity before the sample is selected.
- 6.4 Where it is not practical to visit the plant, samples for both quality and size may be obtained at the destination.
- 6.4.1 If the quality tests are routine procedures, the material may be unloaded and used before the tests are completed.
  - 6.4.2 If the source approval depends upon these tests, the material shall not be used prior to its approval from all respects.
  - 6.4.3 Separate samples shall be taken from as many points in the unit of shipment as is necessary to represent the material. These separate samples will usually be combined to form a composite sample, which shall, if necessary, be reduced by quartering. However, if information on variation is desired, the separate samples shall be tested.
    - 6.4.3.1 Samples of coarse aggregate from stockpiles should be taken at or near the top of the pile, at or near the base of the pile, and at or near an intermediate point. A board shoved into the pile just above the point of sampling will aid in preventing further segregation during sampling.
    - 6.4.3.2 Samples from railroad cars should be taken from 3 or more trenches dug across the car at points that appear on the surface to represent the material. The bottom of the trench should be at least 1 foot (0.31 meters) below the surface of the aggregate at the sides of the car and approximately 1 foot (0.31 meters) wide at the bottom. The bottom of the trench should be almost level. Equal portions should be taken at 7 equally spaced points along the bottom of the trench by pushing a shovel downward into the material, not by scraping horizontally. Two of the 7 points should be directly against the sides of the car.
    - 6.4.3.3 Samples from trucks, barges, or boats should be taken in the same manner as described for railroad cars, except that the number of trenches shall be adjusted according to the size of the transportation unit and the tonnage involved.

6.4.3.4 Fine aggregate may be sampled as described in the above sections, or by means of a sampling tube approximately 1 ¼ inch (31 ¼ mm) in diameter by 6 feet (1.83 meters). Five to eight insertions of the tube into the unit to be sampled will furnish approximately 10 pounds (5 kilograms) of fine aggregate.

6.4.4 Where a test is to be made for gradation only, it is recommended that tests are performed in the field in order not to delay decision on the use of the material. Samples may also be sent to the laboratory for verification testing.

## **7. MARKING AND SHIPPING SAMPLES**

7.1 A card must be included in the sample container that includes information describing the sample.

7.1.1 Who obtained the sample, and their official title

7.1.2 Who submitted the sample for testing

7.1.3 The source of supply and, in the case of commercial supplies, daily production

7.1.4 Proposed use for the material

7.1.5 Geographic location and shipping facilities (name of railroad, canal or river, or other common carrier)

## **8. SHIPPING SAMPLES**

8.1 Coarse aggregate shall be shipped in a secure container or sample bag.

8.2 Fine aggregate or samples containing fine sizes shall be shipped in a tight container or closely woven bag so there will be no loss of the finer particles.

8.3 Stone block shall be securely crated.